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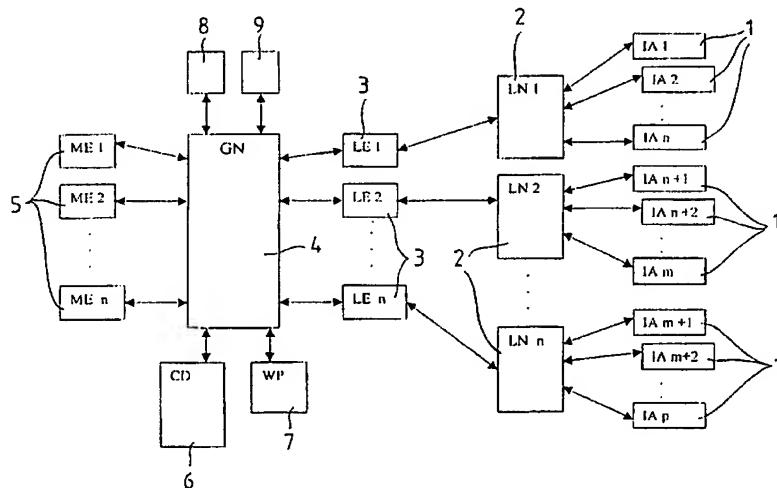
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(54) Title: A DEVICE AND A METHOD FOR RECORDING AND PLAYING VIDEO SIGNALS



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(57) Abstract: A device for recording and playing video signals, comprising means for feeding instructions to the device, means for transferring the recorded video signals to a presentation unit, means for communication with at least one computer network, means for sending a request concerning which video signals to be recorded through the network and for receiving the requested video signals from a local storage unit through the network. A method for recording and playing video signals, whereby a recording device (1) for recording and playing video signals is connected to at least one computer network (2, 4). When instructions are given concerning recording of specific video signals, these are converted into a request that is sent through the network. The requested video signals are transferred to a local storage unit (3). When an instruction concerning playing of the specific video signals is given to the recording device (1), the video signals are transferred from the storage unit (3) to the recording device through the network (2) and the recorded video signals are played.

5 A DEVICE AND A METHOD FOR RECORDING AND PLAYING VIDEO SIGNALS

DESCRIPTION

10 TECHNICAL FIELD

The present invention relates to a device for recording and playing video signals comprising means for feeding instructions to the device and means for transferring the recorded video signals to a presentation unit. The invention also relates to a method for recording and playing video signals.

Such a device is usually called a video cassette recorder and is to be connected to a television set. The video cassette recorder 20 is used for recording and playing video signals, for example television programs and movies. The video signals can originate from different types of television transmissions or directly from a video camera. With video signals is meant an electric representation of moving images.

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PRIOR ART

A conventional video cassette recorder is connected to a television set and can be ordered to record and to play television programs in the form of analogue video signals. The recorded video signals are stored on video tapes. Each video tape has a limited recording time. Therefore, several video tapes are needed if one wants to record many programs. There are many drawbacks with a conventional video cassette recorder, such as that one must 30 always have an empty video tape available when to record, a risk for loosing recorded video tapes, it is not possible to record

programs on several channels at the same time and neither is it possible to record and to play at the same time.

In a further development of the conventional video cassette recorder, the video tapes have been replaced with a hard disk arranged in the video cassette recorder. The incoming analogue video signals are converted in the video cassette recorder into digital signals which are compressed and stored on the hard disk. When playing is ordered, the stored signals are converted into analogue signals which are forwarded to the television set. The hard disk video certainly solves the problem with lost video tapes and makes it possible to record and to play at the same time, but the storage space is limited so that one risks that the hard disk becomes full after a period of time. The hard disk video is not able to record programs from several channels at the same time.

SUMMARY OF THE INVENTION

The purpose of the invention is to provide a device and a method for recording and playing video signals which do not have any limitations when it comes to storage capacity and which makes it possible to record TV programs from different channels at the same time. The invention also makes it possible to order recording of a directly broadcast video casting from anywhere in the world.

What characterizes a device and a method according to the invention is clear from the appended claims.

The purpose is achieved by a recording device which comprises means for communication with at least one computer network, means for sending a request concerning which video signals to be recorded through the network, means for receiving the ordered video signals from a local storage unit through the network.

The purpose is further achieved by a method where the recording device is connected to at least one computer network. When instructions relating a recording of specific video signals are given, these are converted into a request which is sent through the network. The ordered video signals are transferred to a local storage unit. When an instruction concerning playing of the specific video signals are given to the recording device, the video signals are transferred from the storage unit to the recording device through the network, and the recorded video signals are played.

By storing recorded video signals on a local storage unit, preferably a server, which is reached by the recording device through a computer network, the storage capacity becomes practically unlimited. By recording the video signals outside the recording device, it is possible to order a recording of several TV programs, which are broadcast at the same time in different channels, and to both record and play video signals at the same time.

When the recorded video signals are to be played, they are transmitted to a presentation unit, for example a television set.

In one embodiment of the invention, requests for recording of video signals are sent to a central computer unit through a global network, such as Internet. The recorded video signals are then transferred to a local storage unit, which is connected to a local high-speed network. A large band width gives a high transferring speed. The transferring from the storage unit to the recording device takes place through the local high-speed network. One problem with sending video signals through the Internet is that it demands a high transferring speed, i.e. a large band width over the whole Internet all the way to the receiver, which is not always the case. By storing the recorded video signals on a local storage unit connected to a local broad-band

network, where a large band width can be guaranteed, the video signals can be transferred to the recording device in real time through the local network and the high quality of the play can be guaranteed.

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In one preferred embodiment of the invention, external video signals, for example video signals from several TV channels, are received, treated, and stored in one or several central receiving units which are connected to the network, preferably to the global network. Video signals from several different TV channels can be received and treated at the same time. This makes it possible to order a recording of several channels at the same time. Video signals from different parts of the world can be received, treated, and stored in different receiving units which are all connected to the network. In such a way, it is possible to record TV programs from the whole world.

The received video signals can be analogue, and if so, are converted into digital signals by the receiving unit. In order for a transferring in real time to be possible, the video signal must be compressed before they are transferred to the recording device. The digitalized video signals are compressed in the central receiving units before they are stored. The compressed video signals are decoded by the recording device before they are played.

The requested video signals are transferred from the receiving unit to the local storage unit. Since this transferal does not have any demands for transferring speed, it can be carried out by means of the global network. In such a way, video signals can be recorded in different parts of the world and can be transferred over the relatively slow global network to the local storage unit which then, on request from the recording device, transfers the video signals to the recording device through the fast local network.

The request for recording of video signals is sent through the network to a central computer unit which administers requests from a number of recording devices. Each recording device is connected to a local storage unit, where it has its own storage space. Several recording devices can be connected to the same storage unit. There may be many storage units connected to different local networks. The central computer unit functions as the spider in the network and sees to it that the receiving units receive instructions about recording the ordered video signals and that these are then transferred to the local storage units. The ordered video signals are transferred to a local storage unit which is connected to the same local network as the recording device. To which storage unit the video signals are transferred therefore depends on which recording device that has made the request. A recording device can have its recordings stored on several different storage units in the local network. This means that if one storage space is full, another can be used.

In one embodiment of the invention, instructions concerning recording of specific video signals can be given through the recording device. In another embodiment of the invention, the instructions concerning recording of specific video signals can also be given through any other input means connected to the network, such as a wap telephone or a personal computer. This allows that one can request a recording of video signals from any other place than that where the recording device is. It is an advantage to be able to request a recording from any other place, if, for example, one is away traveling or at work, and suddenly realizes that one wants to record some special TV program.

If the request is made through any other entering means than the recording device, the request can be transferred through a web portal to the central computer unit. The web portal can also convey information about which video signals that can be recorded, for example by continuously providing updated program charts which are updated through the global network. Also, spe-

cial information about each program can be continuously provided by the web portal.

5 In one embodiment of the invention, the recording device comprises a web reader, which makes access to the web portal possible. In such a way, the program charts and the information about the programs can be read from the recording device. Recording of a certain TV program from the program chart can easily be ordered, for example by pushing a button. The web 10 reader also makes it possible to surf the Internet through the recording device and to handle e-mail.

15 Instructions concerning playing of recorded video signals are given through the recording device. From the copyright point of view, it is important that the recorded video signals cannot be transferred to just any recording device, but that the recordings are tied to a certain recording device. If recording is ordered from a mobile telephone or a computer connected to the net, information must be given about which recording device to receive 20 the recorded video signals. Thereafter, playing can only be ordered by the stated recording device.

25 The central computer unit comprises means for storing and continuously providing information about what is recorded on each recording device, i.e. what is available for playing on a specific recording device. In such a way, all recorded programs can be shown and sorted after certain criteria. This also makes it possible to search for a certain recording. This also means that it is easy to keep track of recorded video signals.

30 In that many people today choose to record TV programs and to watch them at other times than the broadcasting times which the TV companies have decided, the notion "best broadcasting time" disappears more and more. A further advantage with the invention is that it makes it possible to obtain statistics on which TV 35 programs the customers want to watch and at which times they

wish to watch the programs. This information is of a great interest to the TV companies. With a method according to the invention with a central computer unit which administrates requests from a number of recording devices, it is simple to obtain such
5 statistics.

DESCRIPTION OF THE DRAWINGS

10 One embodiment example of the device and the method according to the invention shall hereafter be described with support from the appended drawings.

15 Fig. 1 shows a block scheme which schematically illustrates a system for recording and playing video signals according to the invention.

Fig. 2 shows a device for recording and playing video signals according to the invention.

20 Fig. 3 shows an example of a program guide.

Fig. 4 shows an example of how such a recording library can look like.

25 DESCRIPTION OF EMBODIMENTS

In Figure 1, a network system for distributing video recordings of, for example TV programs, is shown. The system comprises a number of recording devices 1. Each recording device 1 is owned by a subscriber who subscribes to the service to record and store video signals. Each of the recording devices 1 is connected to some local network 2 with a wide band width, i.e. with a high transferring speed. There may be several different local networks in the system, and each local network can have several different recording devices connected. The local network
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can, for example, be a local net in a multi-apartment house or a local net in a residential area.

5 The system further comprises a number of local storage units 3, where recorded and compressed video signals are stored. The storage unit can suitably be a server which comprises a computer with a large hard disk. Further, the storage unit 3 comprises software and a server application to handle, on one hand incoming orders concerning downloading of video signals to the 10 storage unit 3 and on the other hand requests from the recording device 1 concerning transferal of stored recordings thereto. The storage units 3 are connected on one hand to some of the local networks 2 and on the other hand to a global network 4, such as the Internet. There may be several storage units 3 connected to the same local network.

15 When the video signals are to be played, the compressed video signals are downloaded from the storage unit 3 and transferred to the recording device 1 through the local high-speed network 2. In the recording device 1, the video signals are converted into an ordinary TV-signal, which can be shown on a television set. What transferring speed that is needed also depends on which algorithm of compression that is used.

20 25 The system also comprises a number of receiving units 5, which receives analogue and digital video signals from several TV channels. The analogue video signals are sampled and compressed in the receiving units 5. The compressed signals are then temporarily stored in the receiving units 5, which are connected to the global network 4. A receiving unit 5 comprises a computer with a hard disk and a number of hardware cards for compression of video in real time. The cards compress one TV channel each and store the compressed signals on the hard disk.

The receiving unit further comprises software and a server application for handling incoming requests to record and for the distribution of recordings. When the video signals are completely recorded and compressed, they are transferred to the local storage units 3 for further storage. This transferring has no demands on transferring speed and can be carried out by means of the global network. In another embodiment of the invention, the receiving units and the local storage units can be arranged in the same place physically, i.e. they are arranged in the same computer unit.

A central computer unit 6, hereafter named the computer central 6, is also connected to the global network, which has as its assignment to administrate all data and information in the system, such as requests for recordings from the different subscribers. The computer central can, for example, be a web server. In the computer central 6, there are data bases covering all subscribers, all local storage units 3, and all receiving units 5. Each subscriber has an account of his own at the computer central 6. There, information is stored about which TV programs that are recorded and which programs that are to be recorded. The subscriber sends his requests for which TV programs to be recorded to the computer central 6, which in turn sends the recording commands to the correct receiving unit 5. The computer central 6 also tells the correct storage unit 3 from which of the receiving units 5 it is to collect the ordered video signals so that these are made available for the subscriber who made the request. The computer central 6 is also responsible for continuously choosing the most optimal storage unit 3 for each recording device 1. This means choosing the storage unit 3 with the largest band width and that can offer a free storage capacity to the recording device. In such a way, the number of storage units can be increased or decreased at need, according as the amount of stored recordings is changed, without effecting the subscribers.

In order to make remote control of recordings possible, the system comprises a web portal 7, which is a user interface for the computer central. Through the web portal 7, the subscriber is able to access his account at the computer central from any 5 computer 8 which is connected to the global network and can therefrom order recordings of TV programs. It is also possible to access ones account through the web portal with a mobile telephone 9 which is in contact with the global network. It is only possible to request recordings through the web portal. Commanding a playing of recorded video signals can only be done 10 from the recording device.

Figure 2 shows and example of a recording device 1 which is connected to a television set 10. The recording device comprises a compressor 11, a memory member 12, a network card 13 for connecting the recording device to the local network, a video compressing decoder 14 for decoding compressed video signals, a "scart" contact 15 for transferring the non-decoded video signals to the television set 10, and one means 16 for feeding instructions to the recording device. The network card 13 is preferably an Ethernet card and is also used as connection to the global network. The feeding member 16 can be a keyboard, a button device, a control panel, or a remote control. The recording device can also be equipped with a small hard disk 25 which is able to store a small number of recorded TV programs. In another embodiment of the invention, the recording device can be integrated with some other units, for example, a "set-top-box".

30 The recording device further comprises software in order to show a user interface on the television set which is used, for example, during programming of recordings. The user interface can be a web reader where a number of functions are implemented as web pages, for example, an electronic program guide 35 that shows which programs that can be recorded and is used to program which programs to be recorded. Owing to the fact that

the recording device communicates with a computer central 6, a TV program chart can be downloaded as a homepage from the computer central 6 and shown on the TV screen. From this homepage, programming of recording of TV programs can be

5 carried out in a simple way by clicking on the program one wishes to record. The web reader can be used to surf the Internet and to access services in the web portal 7. The recording device also comprises an e-mail client, which can be used to read e-mails stored in each subscriber's account at the computer central.

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A unique ID belongs to each recording device, for example, the Ethernet address of the recording device, which is used in order for the computer central to identify the recording device. The recorded video signals can also be coded. The coding depends on the ID of the recording device, which means that only the recording device which has ordered the recording can decode the video signal.

15

20 Figure 3 shows an example of how a program guide 20 shown on the TV screen can look like, when a subscriber wants to record a program via the program guide. The program guide 20 is a homepage which the recording device 1 downloads from the computer central 6. The homepage is downloaded every time the subscriber wants to see it. A program guide comprises a channel selector 21 and a program selector 22. When the subscriber has selected a channel, the channel selector shows which selectable programs there are for that channel. The subscriber can choose between recording a program or ordering a

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30 subscription of the program, which means, for example, that the computer central is responsible for recording the three latest episodes of the program.

35 In Figure 4, a recording library 23 is shown, which lists the recorded programs stored in the storage unit and the programs that are programmed to be recorded. The recording library is

shown on the TV screen when a subscriber requests it through the recording device. The information shown in the recording library is stored on the subscriber's account in the computer central 6. The recording library comprises a section 24 with recorded programs and a section 25 with requested recordings.

5 The subscriber can choose to watch any of the recorded programs by clicking the program and thus request a playing of the program.

10 In the following, it is described how the different units in the network system co-operate when a subscriber wants to record a program from his recording device. Initially, the recording device 1 must have access to the computer central 6. This is carried out by the recording device sending its ID through the global

15 network 4 to the computer central 6. The computer central 6 validates the identity of the recording device. The recording device 1 downloads a homepage with a program guide and shows it on the TV screen. The subscriber can now select which program to record. When the subscriber has selected a certain program to be recorded, a request is sent from the recording device 1 to the computer central 6 to record the program. The computer central 6 searches its database covering receiving units for the receiving unit 5 which receives the channel that shows the program and then sends a request to the receiving unit to record

20 the program. The receiving unit 5 validates the request and puts a recording order in its recording queue.

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When the receiving unit 5 has recorded the program, it sends an indication to the computer central 6 that the required recording is available. The computer central 6 searches its database covering storage units after a suitable storage unit 3. When the computer central 6 has found a suitable storage unit 3, it sends an order to the storage unit 3 to download the recording from the receiving unit 5. The storage unit 3 furthers the order to the receiving unit 5 to send the recording to the storage unit 3. When the whole program is available on the storage unit 3, the

storage unit 3 sends an indication to the computer central 6 that the recording is available and it also transmits an identity which has been assigned to the program. The computer central 6 stores the identity of the recording in the recording library of the 5 subscriber, and the next time the subscriber wants to play the program, it is available as a choice in the recording library.

In the following is described how the different units in the network system co-operate when a subscriber wants to play a program from his recording device. Initially, the recording device 1 10 must have access to the computer central 6. This is carried out by the recording device sending its identification through the global network to the computer central 6. The computer central validates the ID of the recording device. The recording device 15 downloads a homepage with the present recording library of the subscriber and shows it on the TV screen. The subscriber can now select which program to be played. When the subscriber has selected which program to be played, a request for that is sent from the recording device to the computer central. The 20 computer central 6 searches its database of storage units after the storage unit 3, on which the requested recording is stored, and returns the information about the identity of the storage unit and the identity of the recording to the recording device. Thereafter, the recording device 1 sends an order to the storage unit 25 3 to send the recording with the given identity. The storage unit 3 receives the order and starts sending the compressed video signals to the recording device through the local network and in time with the recording device 1 receiving the recording, the signals are decoded and transmitted to the television set, where 30 they are shown on the TV screen.

In another embodiment of the invention, it is, of course, possible to show the video signals on some other presentation member than on a TV screen, for example on a computer screen or on a 35 wap telephone.

CLAIMS

1. A device (1) for recording and playing video signals comprising means (16) for feeding instructions to the device, means (15) for transmitting the recorded video signals to a presentation unit (10), **characterized in** that the device further comprises means (13) for communication with at least one computer network, means (11, 12) for sending a request concerning which video signals to record through the network and for receiving the ordered video signals from a local storage unit through the network.
2. A device according to claim 1, **characterized in** that the presentation unit (10) comprises a television set.
3. A device according to claim 1 or 2, **characterized in** that said communication means (13) is arranged for connection to a global network.
4. A device according to claim 1, 2, or 3, **characterized in** that said means for communication is arranged for connection to a local high-speed network.
5. A device according to any one of the previous claims, **characterized in** that said instructions comprise recording and playing of a certain TV program.
6. A device according to any one of the preceding claims, **characterized in** that the device comprises means (14) for decoding compressed video signals.
7. A device according to any one of the preceding claims, **characterized in** that it comprises a web reader.
8. A device according to any one of the preceding claims, **characterized in** that the local storage unit is a server.

9. A device according to any one of the preceding claims, **characterized in** that it comprises means for showing a program guide for programming which program to be recorded.

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10. A method for recording and playing video signals comprising the following steps:

- a recording device (1) for recording and playing video signals is connected to at least one computer network (2, 4),
- 10 - when instructions concerning recording of specific video signals are given, these are transformed into a request which is sent through the network,
- the ordered video signals are transferred to a local storage unit (3),
- 15 - when an instruction concerning playing of the specific video signals is given to the recording device (1), the video signals are transferred from the storage unit (3) to the recording device through the network (2) and the recorded video signals are played.

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11. A method according to claim 10, **characterized in** that the network comprises a global network (4).

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12. A method according to claim 10 or 11, **characterized in** that the network comprises a local high-speed network (2).

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13. A method according to any one of the claims 10-12, **characterized in** that video signals are received, treated, and stored in one or several central receiving units (5) which are connected to the network (4).

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14. A method according to claim 13, **characterized in** that the received video signals are compressed before they are stored in the central receiving unit (5).

15. A method according to claim 14, **characterized in** that the compressed video signals are decoded by the recording device (1).
- 5 16. A method according to any one of the claims 10-15, **characterized in** that said request is sent through the network (4) to a central computer unit (6) which administrates requests from several recording devices (1).
- 10 17. A method according to claim 13 and 16, or 14 and 16, **characterized in** that instructions from the central computer unit (6) are sent to the central receiving unit (5) concerning which video signals to store.
- 15 18. A method according to any one of the claims 13-17, **characterized in** that the ordered video signals are transferred from the central receiving units (5) to the local storage unit (3).
- 20 19. A method according to claim 12, **characterized in** that the video signals are transferred from the local storage unit (3) to the recording device (1) through the local high-speed network (2).
- 25 20. A method according to claims 11 and 13, **characterized in** that the video signals are transferred from the central receiving units (5) to the local storage unit (3) through the global network (4).
- 30 21. A method according to any one of the claims 10-20, **characterized in** that the recording device is connected to a presentation unit (10) and that the recorded video signals are played by transferring them to the presentation unit.
- 35 22. A method according to claim 10, **characterized in** that said instructions concerning recording of specific video signals are given through the recording device (19).

23. A method according to claim 10 or 22, **characterized in** that said instructions concerning recording of specific video signals are given through a mobile telephone (9) or a personal computer 5 (8) connected to the network.

24. A method according to any one of claims 10-23, **characterized in** that information about which video signals that are recordable is given from a web portal (7).

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25. A method according to claim 23 or 24, **characterized in** that the order is transferred through the web portal (7) to the central computer unit.

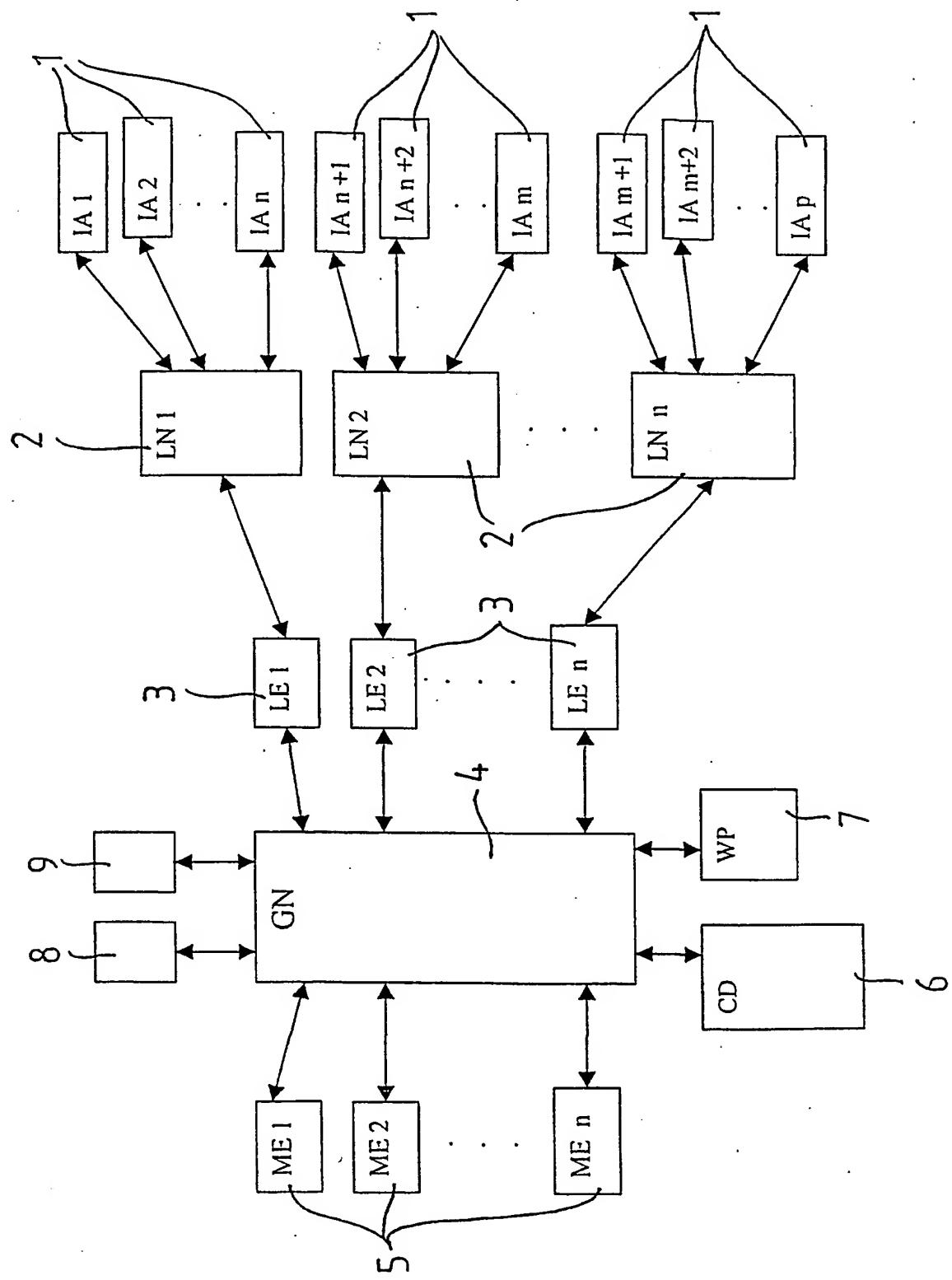


FIG 1

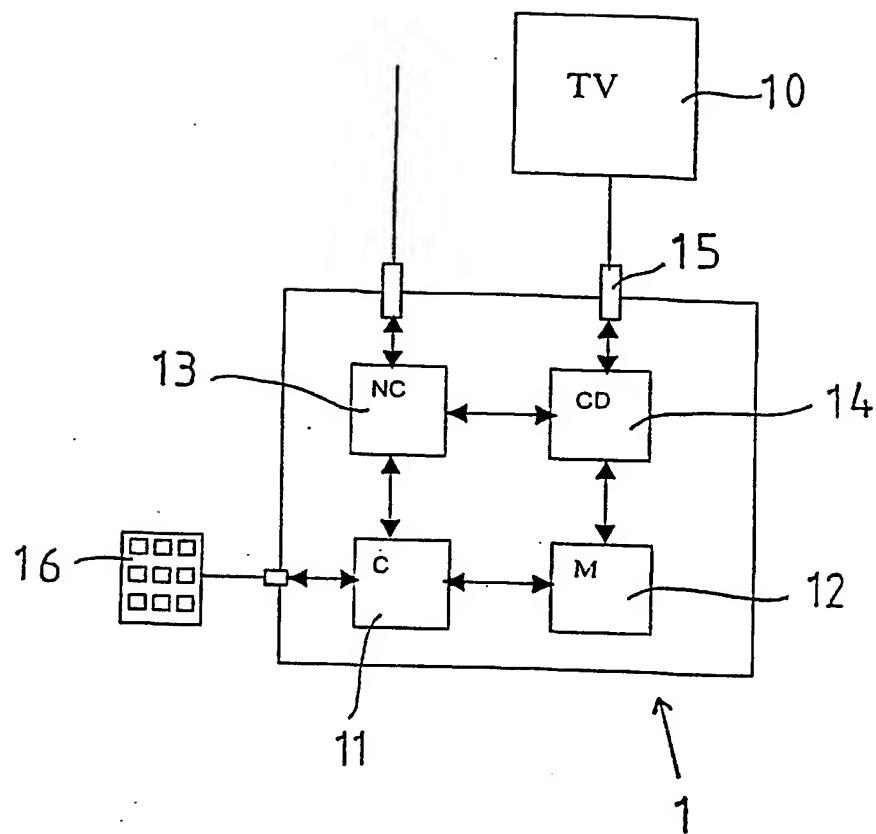
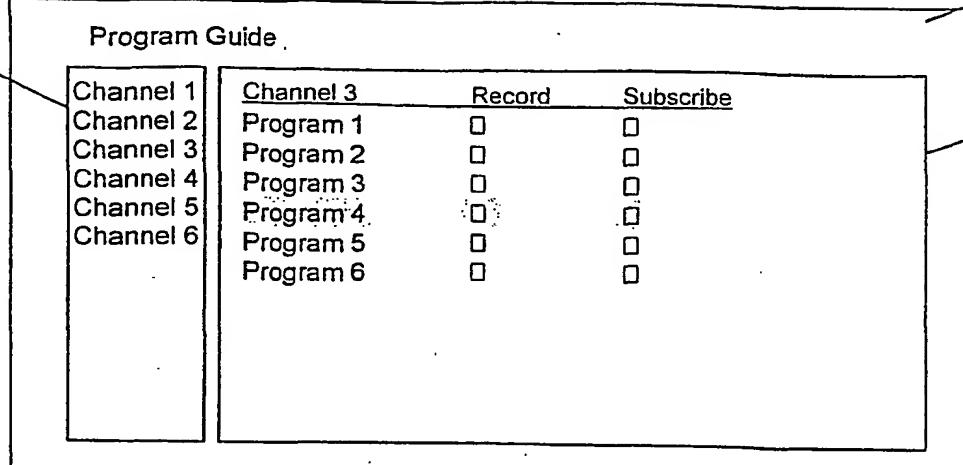


FIG 2



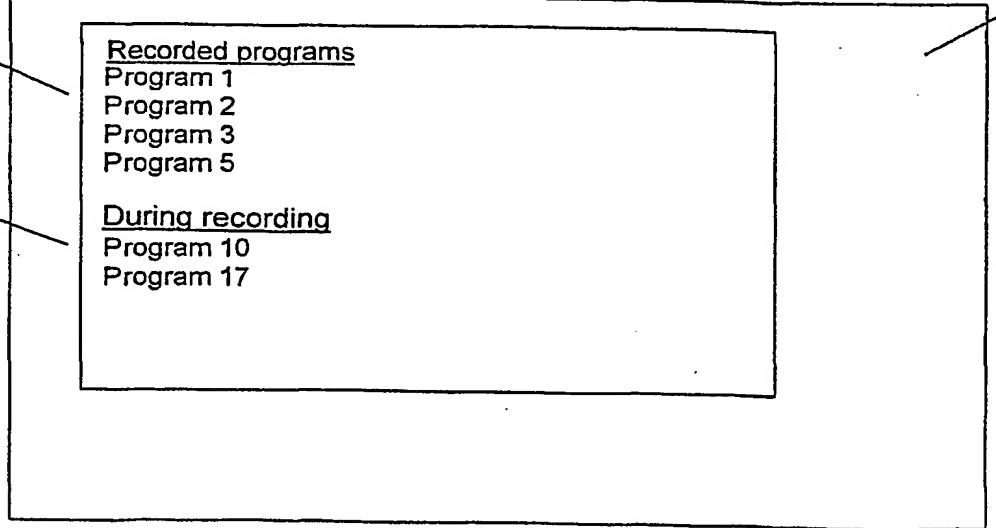
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Program Guide		
Channel 1	Channel 3	Record
Channel 2	Program 1	Subscribe
Channel 3	Program 2	<input type="checkbox"/>
Channel 4	Program 3	<input type="checkbox"/>
Channel 5	Program 4	<input checked="" type="checkbox"/>
Channel 6	Program 5	<input type="checkbox"/>
	Program 6	<input type="checkbox"/>

FIG 3



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Recorded programs
Program 1
Program 2
Program 3
Program 5

During recording
Program 10
Program 17

FIG 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 01/01314

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04N 5/761

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0939549 A2 (NEC CORPORATION), 1 Sept 1999 (01.09.99), column 23, line 23 - column 25, line 27, the whole document	1-8,14-17, 20-25
Y	--	9-13,18-19
Y	US 5991801 A (REBEC,M.S. ET AL.), 23 November 1999 (23.11.99), column 3, line 53 - column 4, line 31; column 4, line 57 - column 5, line 31	10-13,18-19
X	--	
X	US 5751282 A (GIRARD,M. ET AL.), 12 May 1998 (12.05.98), column 2, line 65 - column 3, line 30; column 4, line 34 - line 55, abstract	1-25
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 Further documents are listed in the continuation of Box C. See patent family annex.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 01/01314

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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